Heat Exchanger Design and Optimization Training Course

Professional Development Training Course Outline

Category	General Training	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Heat exchangers are critical components in modern process engineering, thermal systems, HVAC, oil & gas, chemical processing, power generation, and renewable energy systems, enabling efficient heat transfer, energy recovery, and process optimization. Heat Exchanger Design and Optimization Training Course provides a comprehensive, industry-focused understanding of thermal design principles, rating and sizing methods, fouling analysis, pressure drop optimization, and performance enhancement techniques using both classical correlations and modern simulation tools.

With increasing demand for energy efficiency, carbon reduction, digital twins, and sustainable engineering solutions, optimized heat exchanger systems play a vital role in reducing operational costs and improving plant reliability. This course integrates advanced heat transfer theory, TEMA standards, CFD simulation insights, and real-world industrial case studies to equip participants with practical skills in designing, troubleshooting, and optimizing heat exchangers for maximum thermal performance and minimum energy loss.

Programme Curriculum

Heat Exchanger Design and Optimization Training Course

Introduction

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Course Duration

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Course Objectives

1. Master fundamentals of convective & conductive heat transfer mechanisms
2. Apply LMTD and ?-NTU methods for exchanger analysis
3. Design shell-and-tube heat exchangers using TEMA standards
4. Optimize performance using thermal-hydraulic balancing techniques
5. Analyze and reduce fouling, scaling, and corrosion effects
6. Perform pressure drop calculations and flow optimization
7. Improve efficiency using energy recovery systems
8. Understand CFD-based heat exchanger simulation basics
9. Evaluate performance using effectiveness and NTU optimization
10. Apply pinch analysis for process integration
11. Select materials for high-temperature and corrosive environments
12. Implement troubleshooting techniques for industrial failures
13. Develop skills in digital twin-based thermal system optimization

Target Audience

1. Process Engineers
2. Mechanical Engineers
3. Chemical Engineers
4. HVAC Engineers
5. Energy & Sustainability Consultants
6. Plant Maintenance Engineers
7. Design Engineers in EPC companies
8. Graduate Engineering Students

Course Modules

Module 1: Fundamentals of Heat Transfer & Thermodynamics

- Modes of heat transfer: conduction, convection, radiation
- Governing equations for thermal systems
- Heat exchanger classification
- Temperature profiles and driving forces
- **Case Study:** Industrial boiler heat loss reduction analysis

Module 2: Heat Exchanger Types & Industrial Applications

- Shell & tube, plate, finned, double pipe exchangers
- Selection criteria for industries
- Material considerations

- Operational limitations
- **Case Study:** Petrochemical plant shell-and-tube selection optimization

Module 3: Thermal Design Methods

- LMTD method application
- ?-NTU effectiveness method
- Correction factors
- Design constraints
- **Case Study:** HVAC system cooling coil performance improvement

Module 4: Hydraulic Design & Pressure Drop Analysis

- Flow regimes and Reynolds number impact
- Pressure drop estimation
- Pumping power requirements
- Tube-side vs shell-side balancing
- **Case Study:** Refinery exchanger pressure drop reduction project

Module 5: Fouling, Corrosion & Maintenance Optimization

- Types of fouling mechanisms
- Scaling prevention techniques
- Corrosion-resistant materials
- Cleaning strategies
- **Case Study:** Power plant fouling mitigation success story

Module 6: Heat Exchanger Network Optimization

- Pinch analysis fundamentals
- Energy integration strategies
- Waste heat recovery systems
- Process intensification concepts
- **Case Study:** Cement industry waste heat recovery system design

Module 7: Advanced Simulation & CFD Applications

- Introduction to CFD modeling
- Thermal simulation setup
- Mesh generation basics
- Performance validation
- **Case Study:** CFD-based plate heat exchanger efficiency enhancement

Module 8: Industrial Troubleshooting & Digital Optimization

- Failure mode analysis
- Performance degradation diagnostics
- Retrofit and revamp strategies
- Digital twin applications
- **Case Study:** LNG plant exchanger efficiency restoration project

Training Methodology

This course employs a participatory and hands-on approach to ensure practical learning, including:

- Interactive lectures and presentations.
- Group discussions and brainstorming sessions.
- Hands-on exercises using real-world datasets.
- Role-playing and scenario-based simulations.
- Analysis of case studies to bridge theory and practice.
- Peer-to-peer learning and networking.
- Expert-led Q&A sessions.
- Continuous feedback and personalized guidance.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Online	$1,000
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

Ready to enroll or request a customized program? Book online or contact us:

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